Scope of Claims.

Applicants' claims are directed to novel polyurethane films and a method of making the same and an aqueous p lyurethane dispersion useful for preparing the polyurethane film. The dispersions are made by first preparing the non-ionic prepolymer. Water and an anionic surfactant are then added to the prepolymer, all in the substantial absence of an organic solvent, thereby rendering the polyurethane dispersion. The polyurethane dispersions produced by the claimed process exhibit properties similar to natural rubber latexes without the inclusion of dermal irritants and solvents.

Examiner's Rejection of Claims Under 35 U.S.C. § 102(a or b).

The Examiner has rejected Claims 1-5, 7, 9-11, 13-16, and 18 under 35 U.S.C. § 102 (a or b) as being anticipated by WO 98/41554 ("*Tabor*"), GB 1,243,604 ("*Jefferson*"), U.S. Patent No. 3,178,310 ("*Berger*"), or U.S. Patent No. 2,968,575 ("*Mallonee*"). A discussion of this ground of rejection is believed to be obviated by the incorporation of the limitation of Claims 6 and 17 into Claims 1, 9, and 13.

Examiner's Rejection of Claims Under 35 U.S.C. § 103(a).

The Examiner has further rejected claims 1-18 under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,408,008 ("*Markusch*"). This ground of rejection is respectfully traversed.

The Examiner has admitted that *Markusch* does not teach or suggest the use of an anionic surfactant in the preparation of a polymer dispersion. Par. 5 of Office Action. Applicants agree. *Markusch* fails to teach the use of a surfactant, much less an anionic surfactant, during the production of the dispersion.

Further, all of the Examples of *Markusch* require an organic solvent for the production of the prepolymer. While lines 38-52 of column 8 of *Markusch* indicate that "it may not be necessary to employ a solvent during formation of the . . . prepolymer," all of the Examples of *Markusch* require the presence of an organic solvent. It is noted that the bridging paragraph of columns 8 and 9 recite "the presence of a solvent for the prepolymer or the urea-urethane is not necessary to provide a stable, aqueous dispersion"; however, the patentees do not provide any teaching as to how to obtain a stable dispersion in the absence of an organic solvent. It is

Applicants who have discovered that stable dispersions may b prepared in the presence of anionic surfactants and the absence of an organic solvent.

The Examiner attempts t rationalize the shortcomings of *Markusch* by reliance n the "secondary references." (Par. 5 of Office Action). It is unclear as to if the Examiner is rejecting Claims 1-18 over *Markusch* in view of the "secondary references." Assuming that this is the objective of the Examiner, it is unclear as to which of the "secondary references" are being applied.

Each of *Jefferson, Berger,* and *Mallonee* fail to cure the deficiencies of *Markusch*. Each f these references is directed to emulsions, not dispersions. *See Jefferson* at p. 1, line 80-83, *Berger* at Col. 6, lines 60-64, and Col. 7, lines 7-9 and *Mallonee* at Col. 4, lines 48-50. There are distinct differences between a dispersion and an emulsion. An emulsion is a stable mixture of two or more immiscible liquids. A dispersion is a liquid system in which very small solid particles are uniformly dispersed in water. These systems are unique and the disclosure of one is not the disclosure of the other. Since each of *Jefferson*, *Berger* and *Mallonee* are directed to emulsions, their systems require emulsifying agents.

Further, the exemplified prepolymers of *Jefferson* are all prepared in the presence of an organic solvent, most notably toluene. While *Jefferson* indicates that the prepolymer reaction may be conducted in the absence of an organic solvent "[I]f the prepolymer is a fluid at processing temperatures," there is no teaching in *Jefferson* instructive of a method to render a prepolymer not in the presence of an organic solvent. Likewise, *Jefferson* is not instructive of a dispersion containing a prepolymer derived from an aqueous system wherein the particulates have a particle size as claimed by Applicant.

Mallonee, like *Jefferson*, is directed to an oil-in-water emulsion. Most of the Examples are illustrative of the use of octane or toluene in the production of the prepolymer. *Mallonee* teaches the use of an organic solvent in those instances "[W]here the initial addition product is too thick or viscous to emulsify properly in water...." (Col. 2, lines 14-16). As illustrated by the Examples in those instances where water is used to prepare the prepolymer, the resulting prepolymer is mixed with an organic acid. Note, for instance, the use of tall oil in Example 16. The oil is used to form an emulsion. In contrast, Applicant's claims are directed to the production of dispersions in the absence of an organic solvent.

Berger, like *Mallonee*, requires a "water-soluble organic emulsifying agent which will give oil-in-water emulsions." (Col. 7, lines 7-9). *Berger*, like *Jefferson* and *Mallonee*, do not

disclose an aqueous polyurethane dispersion, much less an aqueous polyurethane dispersion containing the particle sizes recited in the claims of Applicant.

Tabor further fails to disclose an aqueous dispersion containing the size of particulates claimed by Applicant.

Further, the references are improperly combinable because one of skilled in the art would not have been motivated to combine them. *Markusch* teaches away from the present invention. A prior art reference may be considered to teach away when "a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 27 F.3d 551, 553, 31 U.S.P.Q.2d 1130, 1131 (Fed. Cir. 1994). *Markusch* teaches away from the addition of an anionic surfactant to render an aqueous dispersion having the claimed particulate sizes. The aqueous systems of *Markusch* are already dispersed. Assuming that one skilled in the art could permissibly combine (i.) teachings directed to the formation of an emulsion with (ii.) teachings directed to the formation of a dispersion (which they could not), what motivation would one have to do so? In other words, why look to a secondary reference for a teaching for the use of an anionic surfactant when the systems of *Markusch* are already dispersed?

Further, *Markusch* teaches the use of an ionic prepolymer in the production of the dispersion. The purpose of this use is "when the potential ionic groups are neutralized, they provide hydrophilicity to the prepolymer and better enable it to be stably dispersed in water. The potential or unneutralized ionic groups do not provide this degree of hydrophilicity." *Markusch* at Col. 10, lines 9-13. A surfactant provides similar results during the production of a dispersion. Having read *Markusch*, one would not look outside the reference for the use of a surfactant. The purpose of the surfactant has been accomplished through the use of an ionic prepolymer. Therefore, although *Markusch* indicates that an external emulsifier "may be blended," one skilled in the art would not look to a secondary reference teaching the use of surfactants after reading *Markusch*.

Examiner's Rejection of Claims Under 35 U.S.C. §112, first paragraph.

The Examiner has further rejected claims 3, 4, 10, 15, and 16 under 35 U.S.C. 112, first paragraph due to a lack of enablement within the specification. It is believed that discussion of

this rejecti n has been obviated by the amendment to Claims 3, 10, and 15 as set f rth ab ve. Support for these amendments is f und in the specification. *See, e.g.*, page 10, lines 13-14.

CONCLUSIONS

For the stated reasons, reconsideration is respectfully requested. In light of the foregoing remarks, the claims of the application have been distinguished over the cited references. The Examiner is requested to contact the undersigned at (713) 226-1142 should he deem it necessary to advance the prosecution of this application.

Respectfully submitted,

DATED: December 6, 2002

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CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.6(d)

I hereby certify that this correspondence is, on the date shown below, being transmitted to the United States Patent and Trademark Office, Commissioner of Patents and Trademarks, Box Fee Amendment, Washington, D.C. 20231, attention Examiner Rabon A. Sergent, via facsimile at (703) 305-5408.

DATED: December 6, 2002

Steven S. Boyd

VERSION TO SHOW CHANGES MADE

1. A polyurethane film comprising a film prepared from a polyurethane dispersi n, the dispersion being prepared from a non-i nic polyurethane prepolymer, and the prepolymer being prepared from a polyurethane prepolymer formulation including a diisocyanate and an active hydrogen containing material wherein:

the dispersion is formed in a two or more step process wherein,

(1) in a first step the prepolymer is formed and, in a subsequent step,

(2) an aqueous dispersion of the prepolymer is formed, in the presence of an anionic surfactant, both steps occurring in the substantial absence of an organic solvent; and

further wherein the particle size of the particulates in the dispersion is from 0.9 microns to about 0.05 microns.

3. The polyurethane film according to Claim 1, wherein the active hydrogen containing material is either:

(a) a mixture of a high molecular weight diol having a weight average molecular weight of from about 1,000 to about 4,000 and a low molecular weight diol having a weight average molecular weight of from about 60 to about 750; or

(b) a high molecular weight diol having a weight average molecular weight of from about 1,000 to about 4,000

wherein, when the active hydrogen containing material does not include a low molecular weight ~~of from about 60 to about 750,~~diol, the prepolymer is dispersed in water which includes a difunctional amine chain extender.

4. The polyurethane film according to Claim 3 wherein the ~~diol having a~~ high molecular weight ~~of from about 1,000 to about 4,000~~diol is a polyoxypropylene diol having an ethylene oxide capping of from 0 to 25 percent.

6. ~~The polyurethane film according to Claim 1 wherein the dispersion has a particle size of from 0.9 microns to 0.05 microns.~~

9. A process for preparing a polyurethane film comprising the steps of:

(a) preparing a n n-ionic polyurethane prepolymer;

(b) dispersing the prepolymer in water in the presence of an anionic surfactant, the particle size of the particulates in the dispersion being from 0.9 microns to about 0.05 microns; and then

(c) applying the dispersion to a substrate as a film;

wherein the prepolymer is prepared from a polyurethane prepolymer formulation including a diisocyanate and an active hydrogen containing material; and

wherein steps (a) and (b) both occur in the substantial absence of an organic solvent.

10. The process according to Claim 9, wherein

the diisocyanate is either:

(a) an aliphatic diisocyanate; or

(b) an aromatic diisocyanate selected from the group consisting of MDI, TDI, and mixtures thereof; and

the active hydrogen containing material is either:

(a) a mixture of a high molecular weight diol having a weight average molecular weight of from about 1,000 to about 4,000 and a low molecular weight diol having a weight average molecular weight of from about 60 to about 750; or

(b) a high molecular weight diol having a weight average molecular weight of from about 1,000 to about 4,000;

wherein, when the active hydrogen containing material does not include a ~~diol having a~~low molecular weight ~~of from about 60 to about 750,~~diol, the prepolymer is dispersed in water which includes a difunctional amine chain extender.

13. An aqueous polyurethane dispersion, useful for preparing polyurethan films, wherein the particle size of the particulates in the dispersion is from 0.9 to about 0.05, the aqueous polyurethane dispersion comprising the product of dispersing in water a nonionic polyurethane prepolymer prepared from a prepolymer formulation including a diisocyanate and a mixture of diols wherein:

the dispersion is formed in a two or more step process wherein,

(1) in a first step the prepolymer is formed and, in a subsequent step,

(2) an aqueous dispersion of the prepolymer is formed, in the presence of an anionic surfactant,

both steps occurring in the substantial absence of an organic solvent.

15. The dispersion of Claim 13, wherein the mixture of diols is a mixture of a high molecular weight diol having a weight average molecular weight of from about 1,000 to about 4,000 and a low molecular weight diol having a weight average molecular weight of from about 60 to about 750.

17. ~~The dispersion of claim 13, wherein the dispersion has a particle size of from 0.9 microns to 0.05 microns.~~

19. A polyurethane film in the shape of a glove, a condom, an angioplasty balloon, a medical bag or a catheter, wherein the polyurethane film comprises a film prepared from a polyurethane dispersion, the dispersion being prepared from a non-ionic polyurethane prepolymer, and the prepolymer being prepared from a polyurethane prepolymer formulation including a diisocyanate and an active hydrogen containing material wherein:

the dispersion is formed in a two or more step process wherein,

(1) in a first step the prepolymer is formed and, in a subsequent step,

(2) an aqueous dispersion of the prepolymer is f rmed, in the presence of an anionic surfactant, both steps occurring in the substantial absence of an organic solvent.

20. The polyurethane film of Claim 19, wherein the particle size of the particulates in the dispersion is from 0.9 microns to about 0.05 microns.